

REMARKS/ARGUMENTS

In response to the Examiner's Office Action of February 23, 2006 the Applicant respectfully submits the accompanying Terminal Disclaimer, Amendment to the abstract and claims and the below Remarks.

Regarding Amendment

In the Amendment:

page 1 of the specification has been updated: the first line of Page 1 of the specification has been deleted and replaced by a paragraph entitled "Cross-Reference to Related Applications".

the abstract is amended to replace the term "comprises" with --has--;

independent claims 1, 19 and 38 are amended to specify that the heater element is arranged within the bubble forming chamber so that a distance between a collapse point of the gas bubble and the nozzle is less than 50 microns. Support for this amendment can be found, for example, at page 20, line 28-page 21, line 2 of the present specification;

dependent claims 12, 31 and 48 are amended to conform with the amended independent claims; and

dependent claims 2-11, 13-18, 20-30, 32-37, 39-47 and 49-54 are unchanged.

It is respectfully submitted that the above amendments do not add new matter to the present application.

Regarding Specification

It is respectfully submitted that the above-described amendment of the abstract provides the correction required by the Examiner.

Regarding Provisional Non-Statutory Double Patenting Rejections

With respect to the provisional non-statutory double patenting rejection of pending claims 1-54 over claims 1-54 of copending Application No. 10/773,197 in view of Pan (US 4,894,664), a terminal disclaimer in compliance with 37 C.F.R. 1.321(c) is being submitted herewith; the present application and Application No. 10/773,197 being commonly owned by the Applicant.

Regarding 35 USC 103(a) Rejections

Regarding Pan in view of Ims (US 4,797,692) and Fukuchi et al. (US 4,549,191)

It is respectfully submitted that the subject matter of above-described amended independent claims 1, 19 and 38, and claims 2, 3, 6, 20, 21, 25, 39, 40 and 43 dependent therefrom, is not taught or suggested by Pan in view of Ims and Fukuchi, for at least the following reasons.

In the present invention, the nozzle structure is configured for enhanced efficiency by positioning the heater element 10 to minimize the momentum necessary for the ink drop to overcome the surface tension of the ink 11 during ejection from the nozzle 3. That is, the heater element is arranged within the nozzle chamber 7 so that the distance between the collapse point of the bubble 12 and the ejection aperture 5 is less than 50 microns (see page 12, lines 6-30 and page 19, line 29-page 21, line 2 of the present specification). Independent claims 1, 19 and 38 have been amended to recite these features of the present invention.

On the other hand, Pan discloses forming the nozzle 19,80 to have a thickness of 1.5 mil to 2.0 mil, such that, as can be seen from Figs. 3 and 11 of Pan, the distance between the point of collapse of a bubble created by the cantilevered heater resistor 12,60 and the orifice 17,82 is much more than 50 microns, as required by amended independent claims 1, 19 and 38 (see col. 3, line 63-col. 4, line 53 of Pan).

Further, one of ordinary skill in the art would not be motivated from the disclosure of Pan to decrease the disclosed nozzle thickness, since the cantilevered heater resistor must have enough space within which to flex so as to compensate for cavitation effects (see col. 5, line 6-25 of Pan).

Neither Ims nor Fukuchi make up for these deficiencies in Pan, because neither Ims nor Fukuchi teach or suggest arranging the heater element within the bubble forming chamber so that a distance between a collapse point of the gas bubble and the nozzle is less than 50 microns.

Thus, the subject matter of amended independent claims 1, 19 and 38, and claims 2-18, 20-37 and 39-54 dependent therefrom, is taught or suggested by Pan either taken alone or in combination with Ims and/or Fukuchi.

Regarding Pan, Ims and Fukuchi further in view of other cited references

It is respectfully submitted that the subject matter of dependent claims 4, 5, 7-18, 22-24, 26-37, 41 and 44-54, is not taught or suggested by Pan, Ims and Fukuchi further in view of one or more of the other cited references in Kubby (US 5,706,041), Dunn (US 4,982,199), Feinn et al. (US 6,543,879), Silverbrook (US 5,841,452), Mitani et al. (US 5,831,648), Kashino et al. (US 5,534,898), Komuro (US 4,965,594), Chan (5,710,070), Pan et al. (US 4,931,813), and Silverbrook (US 5,856,836), for at least the above discussed reasons and because, like Ims and Fukuchi, none of the other cited references teach or suggest arranging the heater element within the bubble forming chamber so that a distance between a collapse point of the gas bubble and the nozzle is less than 50 microns.

It is respectfully submitted that all of the Examiner's rejections have been traversed. Accordingly, it is submitted that the present application is in condition for allowance and reconsideration of the present application is respectfully requested.

Very respectfully,

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